

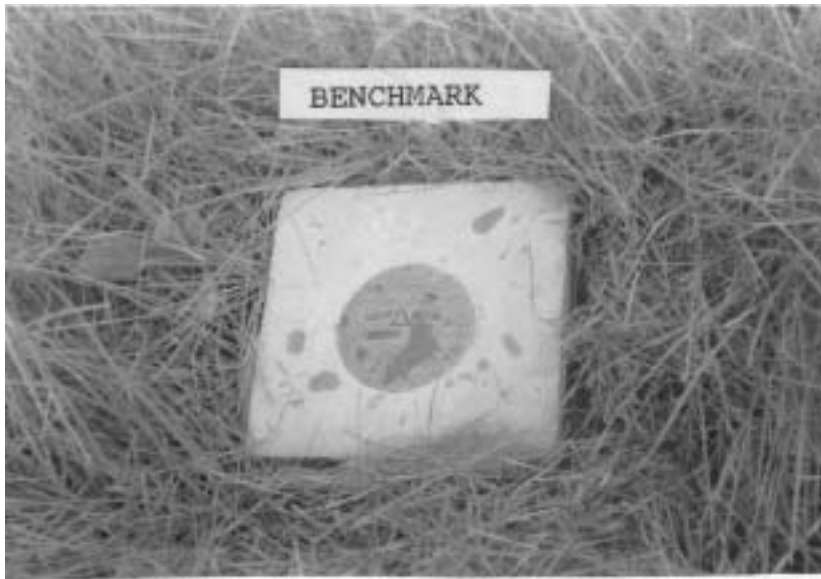
Chapter 13 Benchmark Posts & Tablets, Monuments, and Right of Way Markers

INTRODUCTION

This work shall consist of furnishing and setting, setting only, or resetting right-of-way markers, monuments for marking section or other lines, bench-mark posts and tablets in accordance with 105.03. This work shall be in compliance with section 615 of the specifications.

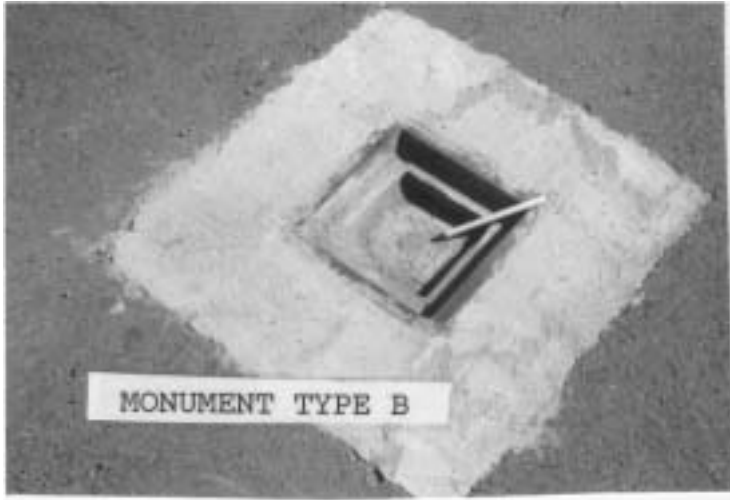
MATERIALS

Benchmark posts and tablets. Bench mark posts shall be of the dimensions shown on the plans and cast in accordance with applicable provisions of 615.03, except the strength shall be determined by concrete cores taken from the finished product. At least two concrete cores will be taken from each unit and the average strength of the unit shall be at least 4000 psi with no individual core strength less than 3600 psi. Tablets will be furnished by the Department and shall be set in the posts as indicated on the plans.



Monuments. Monuments shall be of the type specified in the Proposal book, the details of which are shown on the plans. Any portion extending above the ground shall be finished in accordance with 702.20.

Where concrete is required, it shall be class A in accordance with 702. When placed in the forms it shall be tamped in layers until mortar covers the outer surface. The tops of the monuments shall be floated smooth. Monuments may be cast in place or pre cast and then set.



The pin shall be set perpendicular to and flush with the top of the monument while the concrete is plastic and left undisturbed until the concrete has set. The pin shall be copper and shall be 1 in. in diameter and 5 in. long. If for type D monuments, the hole shall be drilled in the center with a 1/8 in. drill for a depth of 1.5 in. The hole shall be filled with lead flush with the end of the pin. Castings for protected monuments shall be in accordance with 910.05(a).

Reinforced Cement Concrete Right-of-Way Markers. These markers shall conform with the dimensions and lettering shown on the plans. The reinforcement shall be securely held in place by at least four spacers of an approved design. The concrete ingredients shall be graded and proportioned to produce a strong dense concrete.

The markers shall have a smooth workmanlike finish free from cracks, patches, honeycomb, exposed reinforcement, and excessive bubble holes. Each marker shall be plainly marked near the bottom with the trademark or initials of the manufacturer and the date of manufacture. These letters and figures shall be no less than 1 in. in height and shall be indented 1/8 in. Right-of-way markers furnished under this specification shall be covered by a type C certification in accordance with 916.

CONSTRUCTION REQUIREMENTS

Setting Right-of-Way Markers. The back face of these markers shall be set on right-of-way lines approximately 1,000 ft apart as hereinafter provided. They shall be set at all comers of irregular right-of-way lines, opposite each p .C. and p .T .of curves, and not to exceed 500 ft apart on the inside and outside of curves. Care shall be used in locating markers on tangents so that a marker is plainly visible from each of those adjacent.



Markers shall be set plumb, to the depth required on the plans, and with the letters facing the pavement. Portions of the holes not occupied by markers shall be backfilled and compacted in layers with suitable material up to the level of the original ground. The markers shall not be displaced during backfilling.

Markers are typically set with 18 in. of exposed face except for lawns in urban areas where it may be desirable to set flush with existing ground.



Resetting Right-of-Way Markers. When the proposal provides that existing right-of-way markers be reset, the existing markers shall be removed and reset at designated locations in accordance with 615.07.

Setting Monuments. The Indiana Department of Transportation sets monuments to define section lines and to permanently establish vital survey points.

Monuments used by the Indiana Department of Transportation are described and shown on Miscellaneous Standard Sheet MA. These monuments are Section Corner Monuments and Monuments as listed below for survey lines.

- * Monument Type "A" for vitrified brick or bituminous surface on concrete base.
- * Monument Type "B" for flexible pavement.
- * Monument Type "C" to be used when a monument is required outside the pavement area.
- * Monument Type "D" for concrete pavement.

It is the policy of the Department to establish or re-establish all section corners and quarter section corners that fall within the right-of-way for a new or re-constructed facility. The Construction Department will request the local county surveyor to establish all section corners and section lines not already defined by monuments at the time of construction. Should the county surveyor fail to establish such points as requested, they will be eliminated from the contract.

Original survey points e.g. P.I.'s, P.C.'s, P.T.'s, P.O.T.'s and P.O.C.'s will be monumented so that the original survey line for a highway facility may be re-established accurately at anytime after construction. Intermediate points should be monumented so that an instrument man can see a range pole set on an adjacent monument in at least one direction. Also monuments should be located so that the line of sight between adjacent monuments will fall within the right-of-way.

If the location of a monument falls within the limits of a cement concrete pavement, a copper pin, the details of which are shown on the plans, shall be set perpendicular to and flush with the top of the finished pavement. It shall be placed just before the concrete takes initial set and then left undisturbed until the concrete has set. Other monuments shall be of the type shown on the plans, depending on the type or surface of the pavement in which they are to be placed or if they are to be placed outside the pavement. Necessary excavation shall be to the required depth. The bottom of the excavation shall be firm and true to line and grades given. After a monument is in place, the remaining excavated areas shall be backfilled with suitable material firmly tamped in layers. The monument shall not be disturbed.



Existing monuments which are not required to be disturbed or re-established, but which are disturbed during construction operations, shall be re-established.

Re-Established Monuments. It may be necessary to re-establish existing monuments in pavements or bases which are disturbed unavoidably or covered by operations embraced in the contract.

If the existing monument is, or contains a brass or copper pin, the pin shall be extended to the surface of the new pavement by attaching a brass or copper pin with at least a 1 in. diameter and of the length required. Such extensions shall be attached by tapping the original pin and providing a necessary screw attachment such that the extension can be fastened securely to the original pin. The tapped hole shall be at least 0.25 in. in diameter and no less than 1 in. deep. The screw attachment shall have the same diameter as that for the hole in the original pin and shall be no less than 1 in. in length.

Where an existing monument of the type specified above has not been re-established on a previous contract, the monument shall be re-established in the same manner as set out above.

Where existing monuments are protected and encased in cast iron, such castings shall be adjusted to meet the elevation of the proposed surface by means of an asphalt coated, cast iron, adjustment casting. The size shall be the same as the original casting and of the depth necessary to meet the elevation of the proposed new surface.

Setting Bench Mark Posts and Tablets. Benchmark posts shall be set at locations indicated on the plans or as directed. Excavation shall be to the depth indicated and to dimensions sufficient to provide for the concrete backfilling. This concrete shall be class A and shall extend for 6 in. around and below the post. The bottom shall be monolithic with the sides. The remainder of the excavation up to the original ground line shall be backfilled with suitable material well tamped in layers. Care shall be taken not to disturb the post. When specified on the plans, or directed, benchmark tablets furnished by the Department shall be placed in newly constructed or existing drainage structures located within the limits of the contracts.

Reset Bench Mark Posts. When the Proposal book provides that existing benchmark posts be reset, the existing benchmark posts shall be removed and reset at designated locations in accordance with 615.11.

When the relocation of an existing bench mark post is necessary it will be provided for by the item "Reset Bench Mark Post". One should exercise care in the removal and handling. Resetting will be the same as for new bench mark post.

It is necessary that we perpetuate other permanent benchmark systems such as:

- * U.S. Coastal and Geodetic Survey.
- * U.S. Geological Survey.
- * U.S. Army Engineers.
- * Indiana Flood Control & Water Resources System.

The Design Department will notify the appropriate agency when it is found during the original survey that construction will disturb an existing benchmark. A new benchmark tablet along with relocation instructions should be available in advance of construction.

If an existing benchmark is discovered and will be disturbed during construction a letter must be sent to the agency involved. Include in the letter the necessity for the move and the designation of the tablet. The agency involved should send out a new tablet, properly stamped to show it has been reset, along with necessary instructions.

Method of Measurement. Right-of-way markers, reset right-of-way markers, monuments, re-established monuments, castings adjusted to grade monuments, bench mark posts, and reset bench mark posts will be measured by the number of units installed.

Basis of Payment. The accepted quantities of right-of-way markers, reset right-of-way markers, monuments, reestablished monuments, castings adjusted to grade monuments, bench mark posts, reset bench mark posts will be paid for at the contract unit price per each complete in place.

Standard Drawings.

See the following Standard Drawings for further details.

615-RWPB-01
615-SCMN-01
615-SLBM-01
615-SLMN-01